

WHAT IS CLAIMED IS:

1. A package comprising:

a function chip;

5 a volume-shrinking material layer formed on a surface of said function chip; and

a sealing material;

wherein a volume of said volume-shrinking material layer is reduced after said function chip and said volume-shrinking material layer are sealed with said sealing material so that a space enclosing void or gas is defined between the surface of said function chip and said volume-shrinking material layer.

15 2. The package according to Claim 1,

wherein said volume-shrinking material layer is made of heat-reactive material of which volume is reduced when it is cooled after heated, and

wherein the volume of said volume-shrinking material layer is reduced by cooling said volume-shrinking material layer after said function chip and said volume-shrinking material layer are heated while being sealed with said sealing material, or after said function chip and said volume-shrinking material layer are sealed and then heated.

3. The package according to Claim 1,

wherein said volume-shrinking material layer is made of electromagnetic reactive material of which volume is reduced when it is exposed to electromagnetic wave, and

5 wherein the volume of said volume-shrinking material layer is reduced by radiating electromagnetic wave to said volume-shrinking material layer after said function chip and said volume-shrinking material layer are sealed with said sealing material.

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4. The package according to Claim 1,

wherein said volume-shrinking material layer is made of chemically reactive material of which volume is reduced when it reacts with a chemical compound contained in said
15 sealing material, and

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wherein the volume of said volume-shrinking material layer is reduced by allowing said volume-shrinking material layer to react with the chemical compound contained in said sealing material while said function chip and said volume-
20 shrinking material layer are being sealed with said sealing material.

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5. A package comprising:

a function chip;

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a volume-expanding material layer formed on a surface

of said function chip, said volume-expanding material layer having a characteristic that a volume thereof is increased when heated; and

a sealing material;

5 wherein said volume-expanding material layer is cooled after said function chip and said volume-expanding material layer are sealed with said sealing material while being heated so that a space enclosing void or gas is defined between a surface of said function chip and said volume-
10 expanding material layer.

6. The package according to Claim 1, further comprising:

an adhesive layer formed between said volume-shrinking material layer/said volume-expanding material layer and
15 said sealing material for attaching said volume-shrinking material layer/said volume-expanding material layer with said sealing material, and

wherein said volume-shrinking material layer/said volume-expanding material layer and said sealing material
20 are designed such that said sealing material is prevented from being separated from said volume-shrinking material layer/said volume-expanding material layer, when the volume of said volume-shrinking material layer/said volume-expanding material layer is reduced to define the space
25 between the function chip and said volume-shrinking

material layer/said volume-expanding material layer.

7. The package according to Claim 1, further comprising:

5 a releasing agent layer formed between said volume-shrinking material layer/said volume-expanding material layer and said sealing material for facilitating separation of said function chip from said volume-shrinking material layer/said volume-expanding material layer, and

10 wherein said function chip separates from said volume-shrinking material layer/said volume-expanding material layer when the volume of said volume-shrinking material layer/said volume-expanding material layer is reduced to define the space between said function chip and said volume-shrinking material layer/said volume-expanding
15 material layer.

8. A package comprising:

a function chip;
first and second sealing materials; and
20 a volume-shrinking material layer;

wherein said function chip is sealed with said first sealing material, said volume-shrinking material layer is formed on a whole or partial region of said first sealing material, and said first sealing material and said volume-shrinking material layer are encompassed by and sealed with
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said second sealing material, and

wherein a volume of said volume-shrinking material layer is reduced to deform said first sealing material in the whole or partial region towards said volume-shrinking material layer in response to the shrinkage of said volume-shrinking material layer so that a space enclosing void or gas is defined between said function chip and said first sealing material.

10 9. The package according to Claim 8,

wherein said volume-shrinking material layer is made of heat-reactive material of which volume is reduced when it is cooled after heated, and

15 wherein the volume of said volume-shrinking material layer is reduced by cooling said volume-shrinking material layer after said volume-shrinking material layer is heated while being sealed with said first sealing material, or after said volume-shrinking material layer is sealed with said second sealing material and then heated.

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10. The package according to Claim 8,

wherein said volume-shrinking material layer is made of electromagnetic reactive material of which volume is reduced when it is exposed to electromagnetic wave, and

25 wherein the volume of said volume-shrinking material

layer is reduced after said volume-shrinking material layer is sealed with said second sealing material.

11. The package according to Claim 8,

5 wherein said volume-shrinking material layer is made of chemically reactive material of which volume is reduced when it reacts with a chemical compound contained in said sealing material, and

10 wherein the volume of said volume-shrinking material layer is reduced by allowing said volume-shrinking material layer to react with the chemical compound contained in said second sealing material while being sealed with said second sealing material.

15 12. A package comprising:

 a function chip;

 first and second sealing materials; and

20 a volume-expanding material layer having a characteristic that a volume thereof is increased when heated;

 wherein said function chip is sealed with said first sealing material, said volume-expanding material layer is formed on a whole or partial region of said first sealing material, and said first sealing material and said volume-expanding material layer are encompassed by and sealed with

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said second sealing material when heated, and

wherein said volume-expanding material layer is cooled to deform said first sealing material in the whole or partial region towards said volume-expanding material layer so that a space enclosing void or gas is defined between
5 said function chip and said first sealing material.

13. The package according to Claim 8, further comprising:

a first adhesive layer formed between said volume-shrinking material layer/said volume-expanding material layer and said first sealing material for attaching said
10 volume-shrinking material layer/said volume-expanding material layer with said first sealing material;

a second adhesive layer formed between said volume-shrinking material layer/said volume-expanding material layer and said second sealing material for attaching said
15 volume-shrinking material layer/said volume-expanding material layer with said second sealing material; and

wherein said volume-shrinking material layer/said volume-expanding material layer and said first and second sealing materials are designed such that said first and second sealing materials are prevented from being separated from said volume-shrinking material layer/said volume-expanding material layer, when the volume of said volume-shrinking material layer/said volume-expanding material
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layer is reduced.

14. The package according to Claim 8, further comprising:

5 a releasing agent layer formed between said function chip and said first sealing material for facilitating separation of said function chip from said first sealing material, and

10 wherein said function chip separates from said first sealing material when the volume of said volume-shrinking material layer/said volume-expanding material layer is reduced to define the space between said function chip and said first sealing material

15. An integrated circuitry comprising:

15 an integrated circuit chip;

a piezoelectric material chip having an electrode on a surface thereof;

external connection terminals;

a volume-shrinking material;

20 a sealing material; and

a volume-shrinking material layer formed of said volume-shrinking material on a whole or partial region of said piezoelectric material chip;

25 wherein electrode pads on the surfaces of said integrated circuit chip and said piezoelectric material

chip are electrically connected to said external connection terminals, and

wherein a volume of said volume-shrinking material layer is reduced after said integrated circuit chip, said piezoelectric material chip, said external connection terminals, and said volume-shrinking material layer are sealed with said sealing material so that a space enclosing void or gas is defined between the surface of said piezoelectric material chip and said volume-shrinking material layer.

16. The integrated circuitry according to Claim 15,

wherein said piezoelectric material chip includes a SAW filter chip and a quartz oscillator chip, and

wherein said volume-shrinking material layer is formed on regions where pectinate electrodes of said SAW filter chip and oscillating regions of said quartz oscillator chip are formed.

17. An integrated circuitry comprising:

a structure formed on a semiconductor integrated circuit chip; and

a volume-shrinking material layer over said structure;

wherein after said semiconductor integrated circuit chip and said volume-shrinking material layer are sealed

with a sealing material, a volume of said volume-shrinking material layer is reduced so that said structure separates and moves away from a surface of said semiconductor integrated circuit chip.

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18. The integrated circuitry according to Claim 17,

wherein said structure is a coil pattern of metal, and

wherein a whole or partial region of said coil pattern attaches with said volume-shrinking material layer so that the whole or partial region of said coil pattern separates and moves away from said semiconductor integrated circuit chip, thereby to realize a desired characteristic.

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19. A manufacturing process of a packaged component, comprising:

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(a) preparing an element;

(b) depositing a volume-changing member on at least a partial surface of said prepared element;

(c) sealing said element and said volume-changing member with a sealing material;

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(d) shrinking said volume-changing member sealed with said sealing material to release said volume-changing member from the partial surface of said element opposing thereto, thereby to define a space therebetween.

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20. The process according to Claim 19,

wherein said volume-changing member is made of material that shrinks when heated; and

wherein the step (d) is made by heating to shrink said
5 volume-changing member.

21. The process according to Claim 19,

wherein said volume-changing member is made of material that expands when heated;

10 wherein the step (c) is made while said volume-changing member is heated for expansion; and

wherein the step (d) is made by cooling to shrink said volume-changing member heated in the step (c).

15 22. The process according to Claim 19,

wherein said volume-changing member is made of material that shrinks when exposed to a electromagnetic wave; and

20 wherein the step (d) is made by radiating the electromagnetic wave to said volume-changing member.

23. The process according to Claim 19,

the step (b) including,

applying a releasing agent between said volume-
25 changing member and the partial surface of said element

opposing thereto,

applying said volume-changing member on said releasing agent, and

applying an adhesive between said volume-changing member and said sealing material opposing thereto.

24. A manufacturing process of a packaged component, comprising:

(a) preparing an element;

10 (b) forming a cover layer on at least a partial surface of said prepared element;

(c) depositing a volume-changing member on said cover layer;

15 (d) sealing said element, said cover layer, and said volume-changing member with a sealing material;

(e) shrinking said volume-changing member sealed with said sealing material to release said volume-changing member from the partial surface of said element opposing thereto, thereby to define a space therebetween.

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25. A manufacturing process of a packaged component, comprising:

(a) preparing a semiconductor integrated circuit chip and a piezoelectric material chip;

25 (b) arranging said semiconductor integrated circuit

chip and said piezoelectric material chip at predetermined positions;

(c) electrically connecting said semiconductor integrated circuit chip and said piezoelectric material chip to external connection terminals;

(d) depositing a volume-changing member on at least a partial surface of said piezoelectric material chip;

(e) sealing said semiconductor integrated circuit chip and said piezoelectric material chip with a sealing material after the steps (c) and (d); and

(f) shrinking said volume-changing member sealed with said sealing material to define a space between said volume-changing member and the partial surface of said piezoelectric material chip.

26. A manufacturing process of a packaged component, comprising:

(a) preparing a first element;

(b) providing a second element on a surface of said first element;

(c) depositing a volume-changing member on said second element;

(d) sealing said first and second elements and said volume-changing member with a sealing material; and

(e) shrinking said volume-changing member to release

said second element from said first element.